Aquaculture perceptions in the Barcelona metropolitan area from fish and seafood wholesalers, fishmongers, and consumers

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Abstract

Aquaculture provides more than half of the global seafood production and offers a wide diversity of high-quality products. However, its social acceptability is still not well established. The goal of this study was to determine the perceptions of aquaculture by different stakeholders along the seafood value chain in the Barcelona metropolitan area. The methodology used was based on a two-phase qualitative approach: the nominal group technique (NGT) and the Delphi survey. In the NGT phase, three groups, wholesalers, fishmongers and consumers, the latter divided into two subgroups according to the frequency of consumption of seafood, were used to collect and rank positive and negative perceptions about aquaculture. This information was subsequently used to build the questionnaire for the Delphi survey, which involved a group of experts from the board of the Wholesalers' Association, Fishmongers' Guild board and consumers' associations. Results showed that among the different stakeholders the highest concordance in positive aspects of aquaculture products included market issues and the stable quality of farmed products. On the other hand, the highest concordance in negative aspects included the lack of sufficient information about aquaculture, which was a serious issue for all stakeholders, and quality. Globally, animal welfare and environmental impact issues were not of much concern, although they included some minor positive and negative perceptions. The diversity of opinions among experts on certain aspects further emphasizes the need for more information, as they could have a potential role as information prescribers to consumers. We argue that information campaigns can take advantage of the positive perception of market issues (convenience, price, diversity) and quality stability to create a favourable predisposition towards aquaculture and thus help to introduce other problems in which perceptions generate a stronger debate. In communication or marketing campaigns, it is essential to highlight the quality and safety of farmed products, with a particular emphasis on the quality of fish feed as a guarantee of optimal nutritional and organoleptic properties of aquaculture products. Welfare and environment generate minor negative perceptions, so they should appear in campaigns,

with a firm focus on the sustainability of the aquaculture sector, to improve its general image. In summary, the results of this study contribute to identifying the most relevant aspects to be taken into account to improve the public perception of aquaculture in the Barcelona area and may be of help in the design of similar efforts elsewhere.

Keywords

Aquaculture perception, consumer, fishmonger, wholesaler, stakeholder, seafood value chain, communication strategy

1. Introduction

Seafood consumption has increased in recent decades due to a rise in both world population and per capita consumption (FAO, 2018). Most of this increase has been covered by aquaculture, with a production rise from 20 to 110 million tonnes in the last two decades, providing more than half of the global fish production if non-food products are excluded (FAO, 2018). Thus, aquaculture is now one of the fastest growing sectors in food production (FAO, 2018).

Nevertheless, the social acceptability of aquaculture is not guaranteed and remains a debated issue (Bacher et al., 2014; Bacher, 2015; Claret et al., 2012, 2014; Froehlich et al., 2017; Hall and Amberg, 2013; Verbeke et al., 2005, 2007a; Whitmarsh and Palmieri, 2011). Consumers' perception of aquaculture may affect consumption habits and has been identified as a potential key factor for the sector's full development (Alexander et al., 2016; Kaiser and Stead, 2002). Therefore, understanding consumers' perceptions is a first step to build up a strategy that can communicate the benefits of aquaculture and break down its potential myths.

Consumers' perception of aquaculture has been analysed in several countries, focusing on specific issues: comparison of preference between wild and farmed fish (Claret et al., 2014; Rickertsen et al., 2017; Verbeke et al., 2007a), sensorial quality attributes (Farmer et al., 2000; Kole et al., 2009), sustainable and organic aquaculture productions (Whitmarsh and Palmieri, 2011), fish welfare (Feucht and Zander, 2015), and origin and production methods (Claret et al., 2012, 2014). Quality, safety, and sustainability are critical requirements for consumer trust of aquatic products (Claret et al., 2014). As the industry grows, transparency should be put at the forefront, both to maintain the interest of those consumers already buying farmed products as well as to attract new and conscious consumers. Consequently, information about food products is essential and helps to avoid consumer distrust, not only at the end of the value chain but also among the different stakeholders.

Aquaculture has raised concerns about different topics such as sustainability, health or quality (Asche, 2016; Freeman et al., 2012; Froehlich et al., 2017b; Kaiser and Stead, 2002; Mazur and Curtis, 2008; Whitmarsh and Palmieri, 2009). Thus, a negative perception may be transferred from a depreciated image of intensive terrestrial farming or related to the way production was performed in the past (Vanhonacker et al., 2011; Verbeke et al., 2007a). Working with Spanish consumers, Claret et al. (2016) found that the image of aquaculture is not negative per se, but there is a more positive attitude towards wild fish.

The importance of the value chain lies in its economic nature, but other non-economic elements such as personal relationships, are of great importance for business (Contò et al., 2013). Furthermore, information is the second major flow component of the value chain (Handfield and Nichols, 1999) and thus perceptions and opinions of the different stakeholders go along with the marketed goods (Titus and Bröchner, 2005).

In Spain, the fish and seafood market is mainly channelled by two distribution chains: the large retail sector and the small retailers and traditional fishmongers (MAPAMA, 2017). As it has occurred for most food products, traditional fishmongers have seen their market share being progressively reduced. Nevertheless, their economic relevance in the fish and seafood sector should not be underestimated. In 2017, one third of fresh fish was sold in traditional shops, representing more than 160 million kilos, with an economic value of 1,350 million euro (MAPAMA, 2017). In Spain, traditional fishmongers are also known to be essential product advocates for consumers (AECOC-MAGRAMA, 2016). Furthermore, consumers affirmed to take into account fishmonger advice for their buying decisions (Claret et al., 2012).

Fishmongers serve as one of the most relevant sources of information on fish products (Pieniak et al., 2007). At the same time, fishmongers' supply depends on the fish availability at the central markets. Therefore, the products that fishmongers display to potential consumers are, in turn, strongly influenced by the wholesalers' supply, besides their own strategy.

A potential influence between the different components of the value chain regarding the perceptions towards aquaculture cannot be neglected. Thus, it is necessary to describe and compare the perceptions towards aquaculture from each component of the value chain. Studies including the perception of the different types of stakeholders are limited (Alexander et al., 2016; Bacher et al., 2014; Mazur and Curtis, 2008, 2006; Salgado et al., 2015), and they usually do not include the stakeholders of the value chain.

This study focuses on a particular region — the metropolitan area of Barcelona — a food hub in the Mediterranean area, with a high urban population and a central position as a food market.

Mercabarna, the wholesale market in Barcelona, is the leading wholesale market in Spain, as far as seafood and fish are concerned (Mercas, 2017). In 2016, up to 30.3% of the total seafood and fish products in Spain were sold through Mercabarna (178,546 tonnes), providing seafood products to 10 million people in Catalonia, and other countries (www.mercabarna.es). An extensive network of independent fishmongers is responsible for the distribution in the area. Besides, Barcelona is now a reference around the world in the food and gastronomy sector.

The overall goal of this study was to assess the views of different stakeholders on aquaculture products, with discrete insights from three specific groups within the value chain, as opposed to the usual consumer-centric focus of previous studies (Arvanitoyannis et al., 2004; Cardoso et al., 2016; Carlucci et al., 2015; Claret et al., 2016, 2012; Kole et al., 2009; Rickertsen et al., 2017; Vanhonacker et al., 2013, 2011; Verbeke et al., 2007a). To achieve this, our first goal was to determine the perceptions of aquaculture along the seafood value chain, namely consumers, fishmongers, and wholesalers in the area of Barcelona. Specifically, the three following questions are addressed: (1) What are the positive and negative perceptions towards aquaculture from each stakeholder group in the value chain?; (2) Is there concordance, or a common trend in the topics perceived, along the value chain?; (3) Are there agreement and consensus with the previously identified statements based on experts' assessment? The second goal was to use elicited perceptions as the basis to determine what information should be used in marketing or communication campaigns that would help to improve the public image of aquaculture. The results from this study have to be considered in the context of Barcelona, but they can offer insights to other geographical areas with similar features.

2. Methodology

The method used was based on a two-phase qualitative approach: 1) nominal group technique (NGT), 2) Delphi survey (Bromley, 2014; Landeta et al., 2011; Vanmeerbeek et al., 2016).

The two-phases are shown in Figure 1. The NGT method allows exploring the positive and negative perceptions towards aquaculture from different stakeholder groups along the value chain (consumer, fishmonger, and wholesaler), allowing comparison between them and thus the identification of concordance in perceptions, indicating accordance between individuals of two or more stakeholder groups. The second phase, the Delphi method, involves a group of experts. They have to show their level of agreement, as accordance of an individual with a particular statement or affirmation presented to him/her. The comments of each expert allow identifying the consensus and dissensus, as the level of accordance between experts, about the perceptions identified in the first phase, providing a form of validation.

2.1. The Nominal Group Technique (NGT)

The NGT was applied to several groups adding up to 30 participants. The NGT is a particular application of the focus group (FG). This technique was initially developed by (Delbecq et al., 1975) and has been used since then for business and academic purposes (Bromley, 2014; Vanmeerbeek et al., 2016). As in the FG, the desirable number of participants is between 5 and 10. The NGT approach differs from the FG because it applies a fixed structure to the meeting. The NGT is oriented to the generation of ideas and their ordering (ranking).

Participants were divided into four NGT groups to cover the main components of the seafood value chain. The first and second groups were composed of consumers, each with eight participants (n=8). They were divided according to their fish consumption since it is a factor that strongly affects the opinion and the information about the product (Kallas et al., 2013; Quester and Smart, 1998, among others). The consumers were selected by a professional marketing company, which was given the following criteria: consumers from the Barcelona metropolitan area, with an equal representation of gender, who must be fish consumers and involved in food buying at home, within an age range of 18–60 years. Consumers were considered as Regular when their fish consumption was ≥ two times/week, and Occasional when it was < 2 times per week, with minimum consumption of ≥ 1 time/month. Finally, female participation was slightly favoured, as women's responsibility for the household food shopping is generally higher in Spain. The third group was composed of seven fishmongers (n= 7) selected from the Catalan Fishmongers' Guild. The criteria to select the fishmongers were to manage an independent shop and to commercialize both wild and farmed species. The fourth group was composed of seven wholesalers (n= 7) from the Barcelona Central Fish Market Wholesalers' Association, also commercializing both wild and farmed species and selected.

Two researchers from the authors' team with experience in qualitative research acted as moderator and assistant in the present study, never revealing their opinions on the topics discussed. The NGT started with the moderator asking a nominal question to the group of participants. For the subject of study, the nominal question focused on eliciting individuals' perceptions of aquaculture and was divided into two, to provide a more structured debate: (1) 'In your opinion, what are the positive aspects of aquaculture?'; (2) 'In your opinion, what are the negative aspects of aquaculture?'. The two topics, i.e., positive and negative aspects, were dealt in separate rounds. This procedure provided the possibility to promote more open answers and to consider all the points of view that aquaculture, as a general topic, could encompass.

All the participants, avoiding any distraction or interaction among them, answered the questions

privately and individually. First, each participant wrote his/her ideas in silence. Then, they were verbally expressed following the round-robin recording process, whereby one participant at a time provides one insight according to their position in the table (Delp et al., 1977). Every expressed idea was written down and projected on a screen. The following idea from the next group member was asked in turn afterward. Participants with no further ideas to express could skip their turn while being able to enter the round again if new ideas would arise. The moderators made sure that all participants equally understood the sentences without promoting any debate. After this clarification, participants were asked to rank the listed ideas, while no discussion was allowed. Each participant was given 15 points to allocate to the five most important ideas according to his or her criteria, assigning, in written ballots, five, four, three, two, or one point from the most important to the least, respectively. The votes were counted, and the results were shown on the screen. These results expressed participants' opinions from their raw ideas. Until this point, the participant's opinions were expressed and ranked individually. Therefore, this technique helps to avoid unduly participation of specific individuals or miss the involvement of others.

Once the points were calculated and shown, a debate started in which all participants could argue in favour of or against any of the expressed insights shown on the screen. After letting the participants discuss, the second round of votes was performed in the same way as before. These results expressed participants' opinions after argument and debate. The difference in votes between the first and second rounds also showed participants' volatility of ideas over the given topics. The participants had only 15 points to allocate. This limited amount of points had two consequences: First, they had to prioritize their election. Therefore, and regardless of other aspects that could also be interesting for them, they were forced to focus only on the most important ones. Second, if in the second round they decided to change their opinion on a specific statement, they had to modify the score previously assigned to another. All sessions were videotaped for further transcription and analysis.

2.2. The Delphi Method

For the second phase of this study, the Delphi technique was applied to a group of experts. This technique was generated in the 1950s and is now widely used to gain information from professional experts (Rowe and Wright, 2011).

The elicited statements from the NGT phase were used to construct the statements for the Delphi phase, which were later submitted to the experts in a two-round questionnaire. The ordering in the questionnaire was randomized to avoid order bias.

In the first round, experts had to provide their level of agreement with each statement, and second, they were asked about the importance they granted to each statement. The measurements were introduced in a percentage rating scale, ranging from non-agreement/non-importance (0 points) to full agreement/full importance (100 points).

Analysis of the results of the first round were placed in a questionnaire that included: (a) the information collected from all experts in the first round, showing the mean and the standard deviation for each statement, and (b) the individual answers to each statement provided in the first round, to be compared with the overall results. With this questionnaire, in the second round, experts were asked to confirm or to modify the answers given in the first round. Thus, the Delphi method is an iterative process (Davies et al., 2011) that involves at least two rounds to generate the iteration (Landeta et al., 2015).

A total of 14 experts from the consumer, fishmonger, and wholesaler sectors completed the two-round Delphi questionnaire. Wholesaler-distributors were recruited through the Barcelona Central Fish Market Wholesalers' Association; independent fishmongers were recruited from the board of the Catalan Fishmongers' Guild, and consumers were recruited from consumers' associations in Catalonia. The questionnaire had to be answered by members in charge of dealing with food consumption issues.

2.3. Data Analysis

Statements in Delphi phase were listed as participants proposed them and expressed as the percentage of allocated points from the total points assigned. They were grouped in the following categories: (animal) welfare, lack of information, market (including price and economy), quality, health, society, and environment. The first round is considered just an initial assessment. In contrast, the second round is considered a validation of opinions after the debate (Gary and von der Gracht, 2015; Landeta et al., 2015) which provides a definitive ranking that is then subject to further analysis (Hiligsmann et al., 2013; Kristofco et al., 2005).

Analysis of the results from the Delphi phase allows assessing the importance that experts assign to each statement and the level of agreement with the opinions expressed by the participants in the NGT phase. Both parameters are represented on a 0–100 continuous scale.

The statements with importance value ≥ 70 points out of 100 in the second round of the Delphi analysis were assessed as relevant. Then, relevant statements were analysed to assess the level of agreement as well as the level of consensus or dissensus among the experts. After the values of agreement, the quartiles and the interquartile range (IQR), defined as the difference between upper and lower quartiles (Q3-Q1), were calculated. The consensus was reached when the IQR

of agreement values was ≤ 20 on a scale of 100. In the same way, the dissensus among experts was assessed by identifying the statements with an IQR of agreement values ≥ 40, which are then defined as dissent statements (adapted from (Gary and von der Gracht, 2015; von der Gracht, 2012). The statements were analysed individually and assigned to the same categories used for the NGT to allow easier comparison.

3. Results

3.1. Nominal Group Technique (NGT) Phase

The results from the second round of votes were taken to establish the opinion of each of the NGTs. The ideas generated in the NGT in each of the four groups of stakeholders are shown in Tables 1 to 4.

For occasional consumers (Table 1), the most positive aspect of aquaculture when compared fisheries products was the low price (24.2 % of the total allocated votes) while the most negative aspects included the fact that farmed fish undergo non-natural growth (18.8 %) and a worse taste (17.1 %).

For regular consumers (Table 2), the most positive aspect was the low (20.8 %), their acceptable taste (20 %) and the higher health control (17.5 %) while the main negative aspects were a general uncertainty and lack of information (28.3 %), and the fact that chemical products are used for promoting growth in fish farms (24.2 %).

For fishmongers (Table 3), the most positive aspects were the all-year-round availability of aquaculture products (29.8 %), the high diversity in species, sizes, and prices (28.8 %), and the fact that aquaculture provides the market with inexpensive products (21.2 %). The main negative aspects were the lack of trust in farmed fish (31.7 %) and the lack of information and knowledge of consumers (20.2 %)

Wholesalers (Table 4) considered that the most positive aspects were those related to the market, such as buying convenience (28.6 %) and price stability (17.1 %). The main negative aspects were the lack of information on farmed fish feeding, treatments, and genetic modification (52.5%).

Concordance across all four stakeholder groups only appear to apply to market (Figs. 2 and 3), with a positive perception, and quality, with a negative perception, even if there is variability in the level of sentiment. Consumers valued quality much more negatively (>50 %) than fishmongers and wholesalers (<20 %) (Fig. 3). Fishmongers assessed market much more

positively (>80 %) than wholesalers and consumers (equal to or less than 50 %) (Fig. 2).

Concordance across three stakeholder groups (regular consumers, fishmongers, and wholesalers) was identified for lack of information and society, with a negative approach in both cases (Fig. 3), also with variability in the perception level. Wholesalers valued more negatively the lack of information, while fishmongers valued more negatively the statements related to society (Fig. 3).

Furthermore, the two groups of consumers agreed on a slight positive perception about the quality and the health of the aquaculture products (Fig. 2), while wholesalers and fishmongers agreed on a slightly negative perception about market issues of aquaculture (Fig. 3).

3.2. Delphi Phase

A total of 33 sentences were extracted from the NGT phase and presented to the experts. Of these, 20 were assessed as relevant (≥70 points) (Table 5). The majority of the relevant statement was considered positive by the experts (60% of the statements with ≥70 points), while the majority of less relevant statements were negative (76.9% of the statements with <70 points).

When the agreement values were analysed (Table 5), the statements gathering consensus (IQR ≤20) numbered 11 out of the 20 relevant statements, while those showing dissensus (IQR ≥ 40) numbered 5 out of 20. The remaining four statements showed neither consensus nor dissensus.

The statementwith the highest consensus (13.75 expressed as IQR in Table 5) related to price stability and affordability of aquaculture products, and it was also one of the statements considered more relevant (89.64%). At the other end of the IQR range, the statement with the maximum dissensus (65.0) affirmed that aquaculture has more sanitary control than fisheries.

The number of statements, positive or negative, were identified for each category (Table 5). The market category included six positive statements, from which five reached consensus and three negative statements, one of them showing consensus and the other dissensus. The lack of information category included only two statements, both of them negative and reaching consensus. Quality included one positive statement that reached consensus and one negative statement showing dissensus. The society category repeated the pattern of quality. The health category included three statements (two positive and one negative), none of them showing consensus. Dissensus occurred in one of the positive statements and the negative one. The environment category included two positive statements, and only one reached a consensus.

4. Discussion

To improve the social acceptance of aquaculture, it is essential to know perceptions that can influence buying decisions. Thus, the opinion of consumers, but also of those with a potential to impact them, such as fishmongers and wholesalers, is interesting. Fishmonger--consumer interactions provide the basis for embeddedness, a concept that supports the idea that non-economic ties can also enhance human economic interactions (Hinrichs, 2000). In Spain, consumers declared to base their decisions when buying fish on both the quality of the products and the opinion of the fishmonger (Claret et al., 2012) while Fernández-Polanco et al. (2013) suggested an asymmetry between retailer and consumer preferences relating to farmed sea bream.

Lack of information

The lack of information and knowledge about aquaculture practices stands out as the main negative issue that could become a barrier for its social acceptability. The perception of this issue showed a high concordance along the value chain since it was a priority for all the stakeholder groups and experts. In fact, after the debate about the topic, this negative perception increased among wholesalers. Similar studies other countries claim that more information for consumers is needed, confirming the lack of knowledge about species and farming procedures (Feucht and Zander, 2015; Pieniak et al., 2013; Vanhonacker et al., 2011; Verbeke et al., 2007b). In this regard, Feucht and Zander (2015) reported that German consumers infer their knowledge about aquaculture from terrestrial animal farming, which could lead to misinformation and prejudice.

Low interest about the origin of the fish (wild vs. farmed) has been reported among Belgian (Verbeke et al., 2007b) and Spanish consumers (Claret et al., 2012; Honkanen and Olsen, 2009). Therefore, the information provided should be carefully designed, according to the perceptions of the target groups, since it can even change the hedonic evaluation of products (Claret et al., 2016; Kole et al., 2009) or consumption choices (Hall and Amberg, 2013). One convenient way to provide information is the use of labels or certifications. Ecolabels offer confidence in the sustainability of the production system. Its use in Germany increased the willingness to pay of consumers for farmed products (Bronnmann and Asche, 2017), suggesting that sustainability is an important topic to focus when dealing with food consumption in this country. This sort of information is crucial to design appropriate consumer-oriented campaigns to promote aquaculture products. Thus, broad and stakeholder-targeted communication campaigns would be needed to change the perception and increase trust in aquaculture since distrust is a logical

negative consequence from a lack of information. Furthermore, today's technology offers new possibilities to provide information to the consumer along the value chain. For example, new track and trace technologies, such as sensors or the internet of things, could add value by providing helping consumers to build trust.

Quality

Quality has been negatively valued by all the components of the value chain. When addressing quality, a comparison between farmed and wild fish, seen as the natural reference, arises (Claret et al., 2014; Verbeke et al., 2007a). In the present study, the moderators never introduced the issue, and in spite of it, the participants made a comparison between wild and farmed fish. This is contradictory with the findings of Claret et al. (2012), which reported only a moderate interest in the origin for most Spanish consumers, as it is the case elsewhere (Vanhonacker et al., 2011).

When both origins were compared, distrust for farmed fish originated from the perception that their artificial feeding negatively affects their quality. Experts also considered that this is a critical topic, even though there was dissensus among them. Uncertainty about what they are fed promotes the idea that farmed fish is less tasty and less healthy than wild fish. However, when both products were evaluated in a blind experiment, participants preferred farmed fish, while they chose wild fish when the origin was known(Claret et al., 2016). In the present study, we corroborate that the origin of this subjective belief ('farmed fish is less tasty and healthy') is due to the extended idea that artificial diets negatively affect the quality of farmed fish. Similar findings were also reported by Verbeke et al. (2007a), where Belgian consumers attributed a better nutritional and healthier character to wild fish because of a lower level of medicinal and growth-promoter residues than in farmed fish. Thus, the quality of the feed used in fish farming should be considered one of the main aspects that any communication campaign should address.

Nevertheless, some positive quality attributes were also assigned to aquaculture products in all stakeholder groups except fishmongers. The most valued asset by wholesalers and experts was the stability of quality, which could be an remarkable idea to transmit both to consumers and fishmongers together with the quality of the farmed fish feed. Fishmongers should be the target of a specific campaign considering their role as opinion prescribers (Claret et al., 2012). It remains a significant challenge to explain to the society that the farmed fish feed is, as a matter of fact, the guarantee of the organoleptic and nutritional quality of farmed products. Thus, these attributes should also be emphasized in a promotional campaign.

Health

In this study, statements assigned to the category of health, included those referring to nutritional value as well as those corresponding to the definition of food safety according to FAO and WHO (2003) to avoid the potential misunderstanding between the concepts of food safety and food quality. Food safety, which is not negotiable, is related to those issues that may make food harmful to the health of the consumer. Quality refers to all other attributes that influence a product's value to the consumer. The most relevant aspect about health issues is the presence of contradictions, both between and within different components of the value chain, which reflects differences in the perceptions among individuals. All elements of the chain except fishmongers considered that there is a higher control in aquaculture than in fisheries products, mentioning contamination with mercury, presence of Anisakis, and traceability issues. Among regular consumers, apparent contradictions emerged. Thus, they considered that in aquaculture, there is greater food safety control, while, at the same time, they also judged farmed fish as being less healthy than wild fish. This is in agreement with other studies reporting that wild fish is valued as better than farmed fish by many consumers, in terms of safety, healthiness, and nutritional value (Arvanitoyannis et al., 2004; Brunsø et al., 2009; Cardoso et al., 2016; Claret et al., 2016; Hall and Amberg, 2013; Kole et al., 2009; Rickertsen et al., 2017; Verbeke et al., 2007a).

Furthermore, among the experts, the statement achieving the highest dissensus, showing substantial individual differences, was 'Aquaculture has more sanitary controls than fisheries.' Thus, health emerges as a complex topic that should cover many different aspects (e.g., control of contaminants and pathogens). Therefore, the concept of the safety of farmed fish seems to be sensitive and should be carefully addressed in all communication campaigns, as also suggested by Rickertsen et al. (2017).

Market

Market issues, with a positive approach, show the strongest concordance along the value chain, emphasizing that aquaculture products have affordable and stable prices, are available all year round, and offer quantity and diversity of species and sizes.

Negative opinions of fish retailers and wholesalers are determined by their position as professionals of the sector. They refer to the competition between small (fishmongers) and large retailers and the imports of farmed fish, which affect the prices. In this study, however, consumers did not show any concern about the geographic origin of the fish products, while other authors have reported a preference for domestic fish products as a guarantee of superior quality (Carlucci et al., 2015; Claret et al., 2012; Feucht and Zander, 2015). Nevertheless, not all

foreign origins are equally considered, depending on the consumers' perception of each country and the guarantee of food safety that they offer (Claret et al., 2012).

The idea that aquaculture provides products of convenience was regarded as positive and was agreed by all stakeholders. Therefore, this aspect could serve as the basis for a communication campaign where other issues in which the opinions are diverse or not so positive (quality, sustainability, welfare) could also be presented.

Animal welfare

This study showed that animal welfare is not a concern for the components of the value chain or the experts, except for occasional consumers, who had a negative perception that gets worse after the debate between pairs. This finding is in agreement with those of Bacher (2015) and Honkanen and Olsen (2009), who reported a lack of interest in this subject in most regions. Welfare, therefore, is not yet an essential criterion in the decision process of fish buyers, even though they understand the relation between welfare and fish farming and are supportive of new advancements to improve (Kalshoven and Meijboom, 2013).

However, even though the topic of animal welfare still seems not pressing, it cannot be ignored for several reasons. First, there is a small group of consumers for whom it is a concern, and they cannot be neglected. Second, animal welfare, in general, not only in fish, is a growing concern of society and nowadays is mainly focused on farmed land animals (e.g., cows, pigs, and poultry). A similar matter is also emerging as a prominent topic in the aquaculture sector, mainly looking to improve husbandry and slaughter conditions (Browman et al., 2019). The industry is already developing guidelines for fish welfare in the certification and labels to anticipate this, following the European or the member countries rules (AENOR, 2016; EC Directorate-General for Health and Food Safety, 2017). Third, there is a small niche of consumers, with higher ethical standards, that would be willing to pay a premium price for products in which fish welfare and environmental issues are guaranteed (Bacher, 2015; Olesen et al., 2010). The fact that there is not a negative perception about the topic is a good starting point to highlight the positive aspects of fish welfare in aquaculture in communication campaigns.

Environment

Previous studies identified consumers being worried by the negative environmental impact of aquaculture in different European countries (Bacher et al., 2014; ; Whitmarsh and Palmieri, 2011). Thus, we expected to find more concern about the relation between aquaculture and the environment in our results. Surprisingly, only wholesalers considered the wastes of farms an issue. However, occasional consumers saw the relation between aquaculture and the

environment as favourable. The local context may strongly influence the perception of the environmental effects of aquaculture. In the Spanish value chain, compared with other geographical contexts, the environment does not seem to be an issue. This is a thought-provoking fact since 'green' values or environmental preferences have been considered a critical factor in purchase decisions, as Whitmarsh and Palmieri (2011) reported from a survey in Scotland. In other studies, a negative perception has been identified as a consequence of a 'not in my backyard' attitude (Froehlich et al., 2017). In Australia, respondents to a survey expressed strong concerns about aquaculture's environmental impacts (Mazur and Curtis, 2008).

Considering a communication campaign on aquaculture's image, it seems preferable to focus on sustainability, even though the environment has not appeared as a concern as shown by our results. The concept of sustainability is well known today in society; therefore, its use as a basis for a marketing campaign could be a better strategy, assuming that the image of aquaculture is not unfavourable per se. In fact, in a study presenting Integrated Multi-trophic Aquaculture as a more environmentally sustainable approach, Alexander et al. (2016) reported an improvement of the general image of aquaculture as a whole. In Germany, the inclusion of sustainability information through ecolabels had a positive effect, which increased willingness to pay for fish products (Bronnmann and Asche, 2016) while minimizing the relevance of whether fish were of wild or farmed origin. Nevertheless, it has also been reported that the potential improvement of aquaculture image by better explaining its sustainability may not have a direct impact on the purchasing behaviour of consumers (Bacher, 2015; Grunert et al., 2014; Verbeke et al., 2007b).

Society

The statements related to society include ideas like distrust about aquaculture and rejection of farmed products. These first ideas could be considered more influenced by emotions rather than by knowledge-based information, as has also been suggested by Vanhonacker et al. (2011) and Verbeke et al. (2007a) for the general aquaculture image. Another negative idea refers to the competitiveness between fish farmers and fishermen. In recent studies (Ertör and Ortega-Cerdà, 2015), small-scale commercial fishermen were identified as a concerned group about aquaculture. In the present research, the concern for fishermen, not included among the participants, emerged spontaneously from regular consumers. This could be related to the geographical context of the study in Barcelona, not only a seaside city with its fishing fleet but in an area where several small fishing fleets abound.

The main positive idea about aquaculture and society is the generation of jobs. This topic was also a positive outcome from Whitmarsh and Palmieri (2009) in a study of different regions of

Scotland, especially for the most deprived areas. In these specific areas, the socio-economic benefits overcome environmental concerns.

Thus, once again, our results confirm the need to overcome distrust by sending to society a clear, understandable, and scientifically sound message that addresses the first topic in this discussion, the lack of information and knowledge. Distrust and the lack of information and knowledge are two sides of the same coin, explaining why there is not yet unanimous social acceptability of aquaculture products and emphasizing the importance of improving aquaculture's image.

Occasional and regular consumers

Studying two groups of consumers according to their level of fish consumption allows identifying some of the heterogeneity in consumers' perceptions. In the categories in which stronger concordance among components of the value chain was found, namely, market and quality, no remarkable differences between the two groups of consumers were found. The categories in which the occasional consumers differ from regular consumers were those related to ethical issues —environment, with a positive approach, and animal welfare, with a negative approach — which could seem an internal contradiction. Several studies have shown that consumers value farmed fish as best for environmental sustainability and fish welfare (Rickertsen et al., 2017; Verbeke et al., 2005).

The consumption of a specific product generates involvement and, thus, determines its perception (Kallas et al., 2013; Quester and Smart, 1998). In this case, results leave open the potential influence of ethics, specifically animal welfare, on the involvement of occasional consumers of farmed fish, and thus on the willingness to consume it. Considering a marketing campaign, even though there is not a general concern for welfare along the value chain, the existence of a specific profile of consumers assigning more importance to ethical issues should be taken into account.

Concordance across the value chain

An interesting insight of the present study is that it provides specific information about the stakeholder groups that have been analysed, which allows comparing the concordance between groups, something that is rarely found in similar previous studies. Alexander et al. (2016), included fish retailers, but not wholesalers, in their analysis on the perception of integrated multi-trophic aquaculture. Chu et al. (2010) investigated how the perceptions of the stakeholders influence their decision to support aquaculture development in Norway and the US. In this case, retailers and wholesalers were not analysed separately since they were included under a broader group named 'post-harvest professionals,' so the differences between them,

and in the value chain sectors, were not reported. In the present study, we found robust concordance across the three components of the value chain in the perception of specific topics, but also substantial differences in others, which suggests the need of stakeholder focalized campaigns to help improving the image of aquaculture and provides information to be used as a basis for campaigns for each stakeholder group.

5. Conclusions

This study identified a strong concordance in the perceptions about aquaculture among the Barcelona metropolitan area stakeholders in two categories: market and quality. The perception is that aquaculture products are convenient and healthy, but with a quality that needs to be improved. All stakeholders also identified the need for more information on aquaculture products. Ethical values, related to animal welfare and environment, were not globally a cause of concern for the different stakeholders of the value chain, although animal welfare may be a concern for a segment of consumers. Experts showed substantial heterogeneity of perceptions for specific issues, meaning that some of them still had doubts on different aspects of aquaculture production. Such diversity should be an essential concern for the aquaculture sector, as these experts might play an important role in providing messages and as opinion prescribers.

Both participants and experts also proposed terms such as confusion, uncertainty, rejection, and distrust related to aquaculture. These opinions should be a cause of concern for the aquaculture sector and the administration. These aspects highlight the need for communication campaigns. The elicited perceptions identified allow us to address the contents of a potential campaign. The market issues (convenience, price, diversity) could be a crucial primary factor to increase product involvement and awareness, generating a favourable attitude towards aquaculture, before giving way to other issues in which the perceptions are diverse. The most relevant topic is to tackle the perception towards the quality of farmed fish and its feed, which is, as a matter of fact, the guarantee of the organoleptic and nutritional quality of aquaculture products. Wholesalers and fishmongers could be engaged to transmit a positive message about aquaculture only after their negative perceptions of farmed products are reversed, which is especially important for quality and fishmongers.

The information gathered in this study could provide interesting insights for future debate with different stakeholders, including the aquaculture sector, policy-makers, consumers' associations, environment and animal rights activists, and academia. The final results should be portrayed using understandable language and easy-to-read tools, but they should be sound and

scientifically based.

6. Further considerations

It is important to note that the source of information is relevant when considering the level of public belief towards it, even if there is some debate on the importance of the source's credibility (McCluskey and Swinnen, 2011). Scientists, companies, and governments can directly influence public opinion, mainly through the Internet, circumventing biased media information (Newton et al., 2019). A consumer survey developed in the Barcelona area (unpublished data) shows that the most credible institutions, when looking for information about aquaculture, is academia, followed by NGOs, written press, and public administrations. Therefore, a strong recommendation on this issue could be to encourage academia to provide science-based information to eliminate some of the persisting misinformation on aquaculture, with the cooperation of companies and governments, as part of the social responsibility of each body.

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